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SOME ASPECTS OF NORTH AMERICAN ARCHEOLOGY¹

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ARCHEOLOGICAL investigations in North America may for convenience be divided into two classes—those, on the one hand, which are concerned mainly with the question of the existence of early man in the continent, and, on the other, those which relate to later prehistoric peoples, to the immediate predecessors of the historic Indians. With the former class I do not propose to deal here, but wish rather to confine my attention to certain aspects of the latter which have a more or less direct bearing on American ethnology and ethnography. A very considerable mass of archeological material and information of this type has been accumulated in the last half-century. It seems therefore not inappropriate to consider a few of the broader and more general results of this work, the character of some of the problems which it presents, and some of the lessons which we may draw from what has already been done that will help us to more efficient and productive work in the future.

Anyone who may make a general survey of the archeology of North America as it is known at present, cannot fail to be impressed, I think, by one broad and fundamental contrast which exists between the western portion of the continent and the eastern. The contrast lies in this, that in the former area the archeological

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record is, relatively speaking, simple and intelligible, whereas in the latter it is complex and to a large degree baffling. The fact of this contrast and the character of it lead to several interesting conclusions, but before considering these and their bearing on problems of American ethnology and ethnography, it will be well, even at the risk of stating facts which are familiar to all, to refer very briefly to a few concrete examples.

The shell-heaps and burial places along the southern California coast and on the adjacent islands, have, as is well known, furnished a large amount of archeological material. Many of these shell-heaps seem, by virtue of their relation to raised beaches, to be of very respectable antiquity. From some of them and from some of the graves, on the other hand, objects of European manufacture have been obtained, showing that a portion of the sites were occupied in historic times. The character of the objects as a whole, however, is quite uniform, and except for the things of European origin, there is little or no evidence in this region of any other type of culture from the earliest period down to that of the establishment of the missions.

The vicinity of San Francisco bay is characterized by abundant shell-heaps and shell-mounds. Investigation of a number of these has shown that the lower strata lie at present several feet below water-line. There is geological evidence that the shore-line has been slowly sinking, and while the rate of depression is not yet known with certainty, the conditions are such as to lead one to infer a very considerable age for the lower layers of these mounds. In the mounds themselves are found the remains of a culture which is on the whole uniform from the lower to the upper strata, and which merges directly into that of the historic tribes of the vicinity. The uniformity of the culture is paralleled by a similar uniformity of physical type, the crania from the shell-mounds being similar to those of the tribes in residence at the time of the first European settlement. In this region, as in that to the south, no remains indicating the presence of any other type of culture have been found.

Continuing farther to the north, abundant shell-heaps, frequently of large size, are found along the lower Fraser river and the

coast of British Columbia. Here again evidence afforded by forest growth, and by the relation of the shell-heaps to the present shoreline, indicates that the lower layers of these heaps are of considerable age. Careful investigation of these sites has shown that here also there is no sign of any noticeable change in culture from the lower to the upper layers, and that this culture as shown by its remains in these shell-heaps is substantially that of the historic Indians of the vicinity. Unlike the previous case, however, there seems to be indication of a rather radical change in physical type, dolichocephalic crania being present in the lower, but not in the upper layers. Although there would thus appear to be evidence of some considerable change in physical type, the culture has remained virtually constant.

The conditions still farther north, as shown by the shell-heaps of the Aleutian islands, are practically a repetition of those about San Francisco bay. From the lowermost layers containing objects of human manufacture to the uppermost there is revealed no important change in type, only an increasing perfection of the products of a uniform culture, accompanied by a change in the proportions of the food supply obtained from fish and from sea-mammals. Here, as in the other regions to the south, the culture of the shell-heaps is one with that of the historic tribes.

It would appear, therefore, that on the basis of the archeological investigations so far made, we are justified in concluding that in each of the respective areas considered, one and only one type of culture is evident; that such differences as are found to exist between the lower or earlier and the upper or later strata are of such a character and degree as to be most probably ascribed to gradual and uninfluenced development; and that as these various prehistoric types of culture are similar to the cultures of the historic tribes in the respective regions, the various culture types have been in permanent and continuous occupancy from very early times to the present day. There is, in other words, no evidence of any succession of distinct cultures or of any noticeable influence on the local cultures exerted by those of other areas. This purely archeological indication of permanence and stability is in large measure

corroborated by the evidence of the historic tribes themselves, since they seem for the greater part to have been long resident in their present habitats, and to preserve no recollection of migration. Linguistic evidence, to be sure, indicates that some of the tribes are really immigrants, yet they seem to have brought with them little that is recognizable as exotic, and to have been so completely brought under the influence of the new environment that in some cases they have come to be taken as typical exponents of the culture of their respective areas.

If we turn now to the eastern portion of the continent the contrast is at once apparent, for instead of permanence and stability, we find relative impermanence and instability; in place of uniform, coherent archeological remains, we have varied and unrelated types; and compared with the relative absence of apparent relationship to other culture areas, we have clear if baffling similarities with other and widely separated types. Let me again illustrate by a few concrete examples.

Beginning in the northeast, with what is perhaps the simplest case, we find that in northern New England and the maritime provinces of Canada, there seem to be indications, from the archeological evidence, of two somewhat different types of culture. One of these, clearly revealed up to the present chiefly in Maine, is represented in the very old graves which are characterized in part by large deposits of red ochre, and in part by the frequency of the adze, the gouge, and especially the ground slate points, which are often of large size. Objects of other materials than stone do not occur in these graves, and as a rule the burials themselves have completely disappeared except for faint traces of teeth or a few particles of bone dust. In the shell-heaps, which are abundant in the region, no trace of the peculiar ground slate points occurs; the adze and gouge so typical of the old graves are either scarce or entirely lacking; whereas articles of bone and shell, which were absent in the graves, are here abundant, and pottery of a crude variety usually occurs. The two types of sites occur in close proximity, yet each is in the character of its artifacts quite distinct. It seems therefore most probable that we are justified in distinguish-

ing in this region two different and presumably successive cultures.

Turning next to the region about lakes Erie and Ontario, occupied in historic times by tribes of the Iroquoian stock, a somewhat more complex situation presents itself. Here it would seem that three varied types of culture are indicated by the archeological material at hand, although the evidence is as yet in some ways obscure and perhaps insufficient. Most characteristic everywhere, and at least in the more fertile sections of this area predominant, are the remains typical of the Iroquoian tribes found in occupancy in the seventeenth century. Objects of stone, shell, bone, and metal, together with abundant pottery, are found at a great number of sites, usually but not always further characterized by defensive works of a simple nature, many of which are quite accurately datable throughout the seventeenth and eighteenth centuries. Others again are clearly prehistoric, but objects from all the sites show well-marked common features, and the changes and development in form and other respects can be traced from the earlier to the later times. Scattered alike in the fertile region about the lakes, as well as in the more rugged uplands, are various locations from which implements of stone have been gathered, quite unlike any found on Iroquoian sites. These are principally ground slate semilunar knives, short, ground slate points with notched bases, and gouges. While none of these forms are very abundant, they occur in considerable numbers in the area north and south of the eastern end of Lake Ontario, in the St Lawrence valley, and about Lake Champlain, but are absent or scarce in southern and western New York and western Ontario. Rather more widely distributed, perhaps, is another class of objects, also largely foreign to sites of known Iroquoian occupancy. This group comprises the stone tubes, the so-called banner-stones, and various types of gorgets, bird-stones, etc. Technically as products of the stone-worker's art, many of these show a relatively high development both as compared to the known products of Iroquoian tribes and to the group of ground slate objects just mentioned. So far as any evidence at present available goes, these two small groups of objects are quite distinct

from each other, in both type and occurrence, as well as from the types of artifacts everywhere characteristic of the Iroquoian sites in this area.

The extreme southeastern corner of the continent also affords archeological indications of more than a single culture. Taking the area of the peninsula of Florida together with the immediately adjacent territory to the north, the remains of several types may be distinguished. The well-known investigations along the St John river have demonstrated that in the shell-heaps of this section we have traces of a very simple culture. The finds comprise a comparatively small variety of implements of shell and bone, stone objects being remarkably scarce. Pottery and metal objects are in many sites totally lacking, and in others are found only in the uppermost layers. Ornaments of any sort are rare, and evidences of the practice of agriculture comparatively meager, the people apparently living largely on fish and shell-fish. Interspersed with these shell-heaps and also widely distributed throughout the peninsula, particularly in its northern portion, are a large number of mounds, of both the domiciliary and burial types. Extended investigation of these has brought to light the remains of a different type of culture. While objects of shell and bone are still numerous, a much larger proportion of stone objects occurs and ornaments are quite abundant. Pottery, moreover, of several types appears to be generally present, and not a few ornaments and one or two implements of copper have been found. Pipes, which do not occur in the shell-heaps, are of not infrequent occurrence in the mounds. A further contrast with the shell-heaps is shown by the fact that whereas the few crania obtained from these are dolichocephalic, those from the mounds show a predominant brachycephaly.

While the remains as a whole in these mounds would seem to indicate a different culture from that of the shell-heaps, certain of the finds deserve special mention. I refer to the so-called "spade-shaped" objects and circular spool-like ear-ornaments of stone, to the copper plates with repoussé and excised decoration, the rectangular fluted copper ornaments, and copper spool-shaped ear-ornaments in one case overlaid with silver, in one with meteoric

iron. With these may perhaps be included certain biconate earthenware tubes. These objects have been found, in the main, at two sites only, and are of types characteristic of the Ohio valley, Kentucky, Tennessee, and part of northern Alabama and Georgia. At first thought it would be natural to consider these exotic objects as brought to this remote point through the channels of aboriginal trade. It is however suggestive to note that in the two sites where the majority were found, burials at length were largely predominant, whereas the typical form of burial elsewhere in the region is in the flexed position.

In some respects distinct from either the culture of the shell-heaps or of the mounds, are the remarkable remains so far known only from Key Marco on the southwestern coast. I need not do more than refer to these well known and very interesting finds and to their curious apparent relationship alike to more northerly as well as to more southerly regions. Whatever may with fuller knowledge be the final verdict on the evidence which they supply, they clearly reveal a type or at least a stage of culture which differed from others in the area. Whether we are to regard the evidence of Antillean affinities derived from the study of the pottery designs of Florida and adjacent regions as indicating still another cultural stratum, or to consider it as merely a separate or closely related phase of the southern influence shown at Key Marco, is not wholly clear. Certain it is however, that, taken as a whole, the archeological record shows this southeastern corner of the continent to have had a far from simple history.

The last area the archeology of which I wish to consider briefly, is that of the Ohio valley. The richness and interest of this field is proverbial; the collections obtained from it have been large and varied; and the literature dealing with the region is abundant in quantity if at times disappointing in quality. It requires little acquaintance with the sites, the collections, or the literature to recognize that we have here the remains of more than a single culture, that indeed the problem is one of rather baffling complexity. A satisfactory classification even of the various types present is by no means easy, and I shall not therefore attempt to do more than refer briefly to some of the more important features.

Scattered rather widely, although nowhere very common, and more abundant in the northern than in the southern portion of the area, are groups of burials in gravel banks of glacial origin. Commonly placed in a flexed position, the bodies are either without accompanying artifacts or supplied with only a few chipped stone implements of a limited number of types. More abundant by far, and even more widely scattered, but predominant more in the south than in the north, are the so-called stone box-graves. These show a considerable number of variations from the typical cist form, and occur both in cemeteries of varying size and in mounds, the latter form being most characteristic of the Tennessee region. Some contain characteristic burials at length, others show flexed burials, while a few contain cremated remains. Some of these stone box-graves are associated apparently with defensive earth-works often of large size, others seem equally closely related to groups of mounds of complex sacrificial or ceremonial character. Some contain burials devoid of any associated artifacts or are supplied with simple objects of stone only, while from others objects and ornaments of stone, shell, and copper have been taken, showing a relatively high development of culture. In some the crania are apparently dolichocephalic and without any artificial deformation, in others the type is often strongly brachycephalic, and occipital deformation is present. In the great majority of cases nothing of European manufacture is found in these graves, but in some instances evidence of European contact is clear. From the wide variation in the details of this type of burial it would seem that we had here to deal with more than one group of people and more than one type of culture, or at least with one group at two different periods in its history.

A third type of remains in the region under consideration is that of the village sites. These again are of somewhat varied character. Some are clearly associated with large defensive works, or with small mounds of simple structure, whereas others occur quite independently. Many show traces of circular lodge sites and are characterized by extensive ash and cache pits. Burials in some cases were made in the stone box-graves, in others at length without

the use of stone and in close proximity to the houses. The people were dependent largely on agriculture, but also drew a large part of their food supply from hunting, although curiously they would seem not to have made any use of the buffalo. The pottery which they made was of an inferior type, and they had little or no acquaintance with copper.

Still another and in many ways the most important type of remains is that limited largely to southwestern Ohio, and characterized by the well-known elaborate enclosures and complex ceremonial mounds. Although in some instances associated with stone box-graves, the more typical method employed by the builders of these structures was cremation. As evidenced by the elaborate structures they built, they must have developed a rather complex ceremonial life, and had attained considerable skill in the working of bone, stone, and metal, using copper, silver, gold, and meteoric iron. Their pottery, on the other hand, was curiously crude, if we except the single case of the remarkable figurines found in the Turner group.

Whether or not the few cases of effigy mounds found in this area are to be regarded as representing a further distinct culture or are to be allied to one or another of those already referred to, the evidence at hand does not make clear. The same is true in regard to the question of the large mounds of truncated pyramidal type which occur here in small numbers. Without considering any further cases, however, it is clear enough that the history of this region is a more than ordinarily complicated one, and that we must admit here the presence of the remains of a number of different cultures.

This very hasty outline of some of the results of archeological investigation in the eastern part of the continent brings clearly into prominence the contrast referred to in the beginning. On the Pacific coast we seem to have evidence of a number of local types of culture, each showing a continuity of development from the earliest times down to the present, and each being in its own area the only culture found; here in the eastern portion of the country, in each of the areas considered, two or more different types are revealed, some of which at least would seem to have been extinct or almost wholly superseded at the beginning of the historical period.

We have so far dealt with the archeological evidence only in and for itself, its bearing on ethnological or ethnographical questions not having been considered. This is, however, perhaps its most important side, for archeology is but prehistoric ethnology and ethnography—the incomplete and wasted record of cultures which, often in vain, we try to reconstruct and affiliate with their historic descendants. Looked at from this side, the broad contrast already pointed out is significant. The Pacific coast, as we have seen, has apparently been occupied from earliest times by peoples differing but little in their culture from the tribes found in occupancy in the sixteenth century. Cut off from the rest of the country by the great chain of the cordilleras and the inhospitable and arid interior plateaus, the tribes of this narrow coastal strip developed in comparative seclusion their various cultures, each adapted to the environment in which it was found. The immigrants who penetrated to this region from beyond its bounds, brought, it would seem, little with them which has left its mark, and have been so completely molded to their new environment that but for the test of language we should not suspect their distant origin. As is well known, this long strip of territory is conspicuous for its linguistic complexity, the causes of which have been not a little discussed. The long-continued seclusion, the permanence of occupancy, are in this respect therefore not without importance, for it is precisely under such conditions that wide differentiation and division into numerous dialects and languages might be expected. There would seem to be another inference which it would be justifiable to draw from these facts. In several of the ingenious theories relating to the development and origin of American cultures in general, it has been contended that considerable migrations both of peoples and of cultural elements passed along this coastal highway from north to south. If however the archeological evidence is to be depended on, such great movements, involving many elements of foreign culture, could hardly have taken place, for no trace of their passage or modifying effect is apparent. If from the general we turn to the particular, and consider the relations between the archeological material and the individual historic tribes, it appears that we can

feel fairly sure that the prehistoric peoples of each area were in the main the direct ancestors of the local tribes of today, and that the culture of the former was the forerunner of the latter and can be explained by it—that, in short, we have here a developmental series, of which the middle and the end are known, although the beginning is yet to be discovered.

In comparison with the relative simplicity of the archeological record on the Pacific coast, that of the eastern portion of the continent is complex, and might indeed be best described as a palimpsest. This complexity leads inevitably to the conclusion that here there have been numerous and far-reaching ethnic movements, resulting in a stratification of cultures, such that later have dispossessed and overlain earlier. These very natural inferences are indeed corroborated by the traditions of migration and conflict preserved by the historic tribes, whose culture in itself also bears witness to the discrete elements which have gone to its formation. Antillean as well as Mexican and perhaps Central American influences have here been at work, and the possibility of others even cannot be neglected. In the west it seemed possible to associate the archeological remains of each area with its historic tribes; in the east so soon as we attempt to go beyond the general evidence of mutual corroboration of archeological, ethnological, and traditional data, we meet with serious difficulties. We are unable in many cases to affiliate with confidence the various types of prehistoric remains with particular historic tribes, so that as a result the archeological material remains in large part isolated and unexplained, as the modern representatives of these prehistoric peoples are unknown.

The shell-heaps, village-sites, and most of the burial places in northern New England can pretty confidently be ascribed to the Algonkian tribes of historic times, but where shall we look for the representatives or relatives of the so-called Red-paint People who seem to have preceded them? There are, to be sure, various indications which point toward the now extinct Beothuk of Newfoundland, but clear evidence of the relationship is still lacking. The great mass of the remains in New York and Ontario can with certainty be attributed to the Iroquoian tribes in occupancy in the

seventeenth century, but the archeological evidence itself shows them to have been comparatively recent comers, and it is not clear to whom we may ascribe either the simpler types of objects or those indicative of a higher and different culture, whose affiliations seem to run toward the region of the Ohio valley. In Florida we may recognize in the now extinct Timuqua the authors of the mounds of the northern part of the state, and with good reason suppose them to have succeeded in occupancy the builders of the shell-heaps of the St Johns. But whether these latter had formerly a greater extension or were related to any of the other tribes of the region, we do not know. Equally uncertain are the relations of the remarkable finds at Key Marco. Are they to be regarded as typical of the fierce, sea-roving piratical tribes of unknown linguistic affiliation who occupied the region in the sixteenth century? If so, how are we to account for the close relationship shown by many of the objects found to those typical of northern Alabama and Georgia and the country to the north?

Most difficult of all are the remains of the several cultures in the Ohio valley. In the extreme northeast the village sites and defensive works may reasonably be associated with the historic Erie, but it is quite uncertain how far southward and westward their remains extend. The Lenâpé, in their historic seats on the Atlantic coast, not infrequently, it would seem, constructed stone box-graves, and it is most probable that part at least of the numerous remains of this type in the Ohio valley (which area was by tradition their earlier home) are to be attributed to them. Graves of this type, however, containing typically undeformed dolichocephalic crania, are found clearly associated with the highest material culture of the valley. If we are to connect these, therefore, with the prehistoric Lenâpé, we must accept a radical change and considerable degeneration in culture coincident with their settlement on the Atlantic coast. We have again the problem of the typical stone box-graves of Tennessee, with their strongly deformed crania, absence of elaborate mounds and earthworks, and presence of types of pottery that are unknown in Ohio. The Cherokee traditionally occupied portions of the upper Ohio valley, and claim indeed to

have constructed some of the larger elaborate burial mounds of the region. The archeological material available, however, leaves something to be desired in substantiating this, and in determining the limits of their occupancy.

The earliest traditional home of a number of the western Siouan tribes lay in the lower Ohio valley, and the existence of a considerable body of tribes of the same stock in the middle Alleghanies has led to the belief that the Ohio valley must either itself have been the early habitat of both branches of the stock or that it served as a highway by which considerable portions migrated either east or west. If this be true, we may ask which of the various types of remains in the region is to be attributed to this stock? The association of the effigy mounds of Wisconsin and the adjacent area with the Winnebago or other Siouan tribes seems now reasonably certain, and one might therefore naturally regard the Serpent mound and the few others of this effigy type in the Ohio valley as due also to tribes of the same stock. Yet these Ohio valley effigies are hardly to be considered as tentative and early forms, as they should be, if they are the first efforts in this direction in the prehistoric habitat of the stock.

Our difficulties are however by no means confined to this type, for how are the various types of remains, quite irrespective of their tribal affiliations, to be related to one another in time? The builders of the stone box-graves would seem to have been at least in part contemporaneous with the builders of the elaborate mounds and earthworks, but they do not all show such evidence; and whether the beginning of the stone box-grave people overlapped the end of the period of construction of the ceremonial mounds and elaborate earthworks, or vice versa, is not wholly clear. That the stone box-grave builders were themselves contemporaneous over the whole area would seem to be indicated by the close similarity, amounting in some cases to identity, between the finds made in the graves at points so far apart as Illinois and Alabama; they would seem, on the other hand, to have disappeared from some sections much earlier than from others. The complete absence again from village sites such as that at Madisonville, of objects characteristic of the

higher cultures, would indicate either that these sites completely antedated the higher culture of the Ohio valley or followed it only after it had entirely passed away. The absence of buffalo bones from such sites may be significant in this connection.

The archeological investigations in this eastern portion of the country present us with many other problems, such as those associated with the distribution of certain types of objects. Are we to regard this distribution as due to actual migration of tribal groups from one section to another, or to the results of aboriginal trade? Are the spool-shaped copper ear-ornaments, for example, found from Florida to Illinois, or the biconate tubes found from Florida to New York, so widely distributed merely as a result of trade? Were the pyramidal mounds with graded ways of the upper Ohio valley mere copies of those seen or heard of in the region farther south, or were they built by actual colonies or stray fragments of the builders of these southern mounds themselves? At present it is impossible to say.

Again, we have been able, on the basis of the material available, to determine a number of characteristic and more or less clearly defined types. We have, to take pottery as an example, a Middle Mississippi type, marked by certain peculiarities of form and ornament; and we have a southeastern type, characterized among other things by the use of stamped decoration, which same method is found employed again in the Northwest. We have, however, made little progress in correlating our different types: in indicating the relationship of the stamped decoration of the Northwest to that of the Southeast, or in tracing the origin and development either of this form of ornament or of the polychrome decoration and modeled type of pottery of the Middle Mississippi region.

It is unnecessary however to illustrate further the complexity of the problems or the difficulties surrounding any attempt to relate the archeology of much of the eastern portion of the continent to the historic tribes; to trace clearly the influences from distant cultures which have made themselves felt; to decide whether the wide distribution of certain implements and types is due to migration or trade; or to correlate the different types which we have

defined, and follow out their development. The point which I want to make, however, and that to which much of what has been said, trite though it be, directly leads, is that to a large extent the difficulties and perplexities are of our own making. With honorable exceptions in more recent years, the archeological investigations so far made in this country have been woefully haphazard and uncoördinated, and the recorded data often sadly insufficient; the published reports have too frequently been unsystematic and incomplete; and there has been too little indication of a reasoned formulation of definite problems, with the attempt to solve them by logical and systematic methods. It is no doubt easier and perhaps pleasanter to skip about aimlessly in investigation, taking such opportunities as happen to present themselves; it makes a more attractive report to omit much uninteresting and supposedly unimportant detail, and to describe and illustrate by a few fine plates only the more striking objects, merely alluding to or passing over entirely the more common but often very important things; it requires considerable preliminary time and study to realize and define the real problems—all this is no doubt true, as well as that there are often practical difficulties in the way of carrying out a scheme that has been carefully considered. Nevertheless, these facts do not excuse us for the neglect of saner and more truly scientific methods.

A concrete example will make my meaning plainer. The separation of the Siouan stock into two main divisions, an eastern and a western, has already been referred to. These two groups, together with the other smaller fragments, must at some time in the past have occupied a single continuous area. The location of this early habitat, the order of separation of the various groups, their lines of migration, and the successive stages in the cultural modifications produced by new environment and association with other tribes and cultures—these and many other kindred questions are of much interest and importance not only for themselves, but in their bearing on the question of the growth of American culture as a whole, and on the still wider problems of the development of culture in general. We can trace historically the stages in this process as it

relates to one group at least of the stock, namely, in the movement of some of the Sioux from the forested region out into the plains, with the consequent transformation in the life and culture of the people. The facts in this case are historic, but a careful archeological investigation of successive sites from west to east in this region would indicate the main features of these changes which in this instance we happen to know from contemporary observation. There is no reason to suppose that the earlier prehistoric movements and changes among the other sections of the stock differed in character from those just referred to. So that if the Quapaw formerly lived on the Wabash and lower Ohio and were there ignorant of the manufacture of polychrome pottery, they did not suddenly acquire the art without some stimulus, nor at once attain to the highest excellence in its practice. There must have been stages between the location on the Wabash without knowledge of this type of art and the location in their historic sites, with the knowledge, and these intermediate stages must lie somewhere between the two extremes. It may well be replied that such a statement is puerile, that it is self-evident and assumed as a matter of course; but if so, why have not these self-evident principles been applied? Why has no systematic attempt been made to trace back, let us say, the Quapaw to their original or earlier home, to determine the stimulus which led to this special development of art, and to follow out the line of its growth? We recognize, to be sure, a special Middle Mississippi type of pottery, but so far as I know this group has not been analyzed into its constituents, to trace the differences in detail due to the practice of the same general form of art by several discrete peoples, separating the various elements and influences which are apparent, and following them wherever they may lead. If there are gaps in the evidence, why not make a systematic attempt to fill them? On the basis of evidence at hand a working hypothesis or several alternative hypotheses may be framed, and material sought which shall either prove or disprove them.

Thus the eastern Siouan tribes have either been settled in their historic habitat for a very long period, or have migrated thither from elsewhere. One hypothesis has already been framed according

to which they formerly lived in the Ohio valley, together with the majority of the remainder of the stock. The Ohio valley contains, as already pointed out, archeological material of several different types, the authorship of which is still obscure. If the Siouan tribes did formerly occupy the region, some of these remains must be attributed to them. To settle this question and to determine which if any of these types is to be attributed to this stock, one would logically proceed to investigate a number of known Siouan sites, and work back from these toward the area in question. It would be necessary to apologize for stating so simple a chain of reasoning, were it not for the fact that the puzzling problems of the archeology of the Ohio valley and of the origin and migrations of the Siouan stock have been before us for many years and are still unsolved, and so far as I am aware, no attempt has been made along such obvious lines to arrive at a definite or probable conclusion on this or on many other similar questions.

This is merely one out of many such examples which might be given of the probable advantage of carrying on our archeological investigations not only in a more systematic manner, but in one which rests firmly on an ethnological and ethnographical basis. The time is past when our major interest was in the specimen, the collection, the site as a thing in itself; our museums are no longer cabinets of curiosities. We are today concerned with the relations of things, with the whens and the whys and the hows; in finding the explanation of the arts and customs of historic times in the remnants which have been left us from the prehistoric; in tracing step by step the wanderings of tribes and peoples beyond history, beyond tradition; in attempting to reconstruct the life of the past from its all too scanty remains. It is only through the known that we can comprehend the unknown, only from a study of the present that we can understand the past; and archeological investigations therefore must be largely barren if pursued in isolation and independent of ethnology.

This is all very well, all very true, one may say, but we live in a very practical world. It is one thing to draw up an ideal plan of investigation, and evolve simple theories; it is another to apply

the theory and to carry out the plan in practice. Local and personal interests and prejudices in those carrying out or providing for archeological work must be reckoned with; important sites have either disappeared or been plundered or carelessly dug in earlier years, or are jealously guarded by unenlightened owners who refuse permission to excavate; the work really desirable is too costly, or not productive enough for the purposes of display—these and many other difficulties of course stand in the way of carrying out an ideal program. Yet in spite of these facts is it not time that we made more of an effort than has yet been made to approach the subject from the ethnological point of view? Is it not possible for us to carry through, before it is too late, even if not with ideal completeness, some of those investigations without the results of which we shall always be groping in the dark? Is it not something of a reproach to American Archeology that it has so far failed to realize and appreciate, as fully as it ought, the need of applying to the solution of its problems the principles which have, in other lands, led to such substantial and magnificent results?

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THE RELATION OF ARCHEOLOGY TO ETHNOLOGY

FOLLOWING the address of Professor Dixon at the New York meeting of the American Anthropological Association, the subject of the Relation of Archeology to Ethnology was discussed at length. Of those who participated in the discussion, Mr W. H. Holmes, Dr George Grant MacCurdy and Dr Berthold Laufer have responded to the request to present their remarks, which follow.

REMARKS BY W. H. HOLMES

IT is natural that the ethnologist engaged in the study of the tribes and stocks and their culture should lay particular stress on the importance of the prehistory of these groups and seek to follow the various threads of their history far backward into the past. To him the chief value of archeology is that it may cast additional light on the particular subjects of his research. To this attitude there can be no objection, and the archeologist stands ready to aid in this work; but he realizes his shortcomings in this direction, having learned that traces of particular peoples fade out quickly into the generalized past. A few generations, or at most a few centuries, close definite record of tribal history; beyond this the

field of archeological research extends indefinitely and gleanings from this field are utilized in answering the greater problems of the history of the race as a whole. The field of the ethnologist has but a limited range when the entire history of man is considered, yet without the many hints which it furnishes for the interpretation of the past the archeologist would often find himself groping in the dark.

REMARKS BY GEORGE GRANT MACCURDY

On the Relation of Archeology to Ethnology from the Quaternary Standpoint

THE archeologist deals with the dry bones of ethnology. This is particularly true when it is a question of the same or of an adjacent geographic area. Under such circumstances the difficulties of bringing back to life the ethnology of the past and the liability to err in the drawing of conclusions are reduced to a minimum. As soon, however, as great distances are to be covered and great lapses of time are to be considered, the problem at once becomes vastly complex. Instead of dry bones we have to deal with fossil forms, some of which are wholly extinct.

The European prehistorians of the early days of the science were justified therefore in calling their special field paleoethnology. The term archeology covers a period that is in part historic and in part prehistoric. It has been so largely appropriated by the Egyptologist, and the student of Greek and Roman archeology, that a more definite terminology is needed for the remote past—prehistory for example, or prehistoric archeology.

After citing a few instances of the more or less near relationships between prehistoric archeology and ethnology I shall confine my remarks chiefly to the remoter relationships in time as well as space.

In the recent study of a series of ancient shell gorgets from graves in Perry county, Missouri, near Saint Marys,¹ I was very much impressed by the probability of a relationship between the symbolism on two of these gorgets and certain institutions that still persist among the Plains Indians. In the game of *itsé'wah* the Piegan Blackfeet make use of a metal ring wrapped with rawhide and cross-barred with sinew, on which beads of various colors are strung, and a wooden dart not unlike an arrow with its shaft. Before their acquaintance with the metals of the white man they employed flat stone disks of convenient size. A stone disk of this sort was given to Dr George Bird Grinnell in 1898 by the wife of Chief Three Suns. It had come down to Three Suns through

¹ *American Anthropologist*, July-September, 1913.

many generations. This stone disk, together with the wooden dart used by Three Suns and a modern metal ring disk wrapped with rawhide, were recently presented to Yale University by Dr Grinnell.

On one of the shell gorgets¹ from Saint Marys is represented a human figure evidently in ceremonial garb, and in the act of throwing a stone disk of approximately the same size and shape as the stone disk of Three Suns. Moreover in the left hand is held a wand that might well represent a variant of the Piegan wooden dart; for it is marked by an oblique band and the wooden dart is marked for nearly half its length by a painted spiral groove. Should a Piegan Blackfoot artist with the skill of the ancients wish to depict a player of the game *itsē'wah* he could hardly do better than copy the figure from this ancient shell gorget.²

Another shell gorget³ from the same cemetery is likewise decorated with a human figure, but representing a very different scene. Each outstretched arm passes through the figure of a star. Below these and opposite the knees are two other larger stars, making four in all. The human figure is thus suspended, as it were, in the heavens from two stars through which the arms pass, while arrows are being shot at it from the east and the west—one at the forehead, one at the back of the head (in line with the ear ornament), one at the left side, and two at the feet. The portion of the shell broken away and lost probably carried with it a sixth arrow aimed at the right side. The designs above and overlapping the large lower stars are bilaterally symmetrical; their fragmentary condition leaves their meaning obscure.

This gorget is full of symbolic import. The stag horn, as suggested to me by Mr Stansbury Hagar, might be considered as an attribute of the sky-god, and the four stars as the four quarters of the sky. The arrows are suggestive of sacrifice and might point to some such ceremony as the Skidi rite of human sacrifice described by Dorsey.⁴ The victim is a young woman taken from an enemy's camp and dedicated to the Morning Star. In the construction of the scaffold the four directions play an important part. The maiden's hands are tied to the upper cross-bar which points to the north and south; her feet to the topmost of four lower cross-bars. Her blanket is removed, and a man rushes up from a hollow in the east, bearing in his hand a blazing brand with which he touches her in the groins and armpits. Another man approaches and touches her

¹ Op. cit., fig. 70.

² A shell gorget from Eddyville, Kentucky, depicts a like scene.

³ *American Anthropologist*, op. cit., fig. 77.

⁴ *Congrès international des Américanistes*, XV session, Québec, 1906.

gently with a war-club in the left groin; he is followed by three other men, the first touching her with a war-club in the other groin, and the other two in the arm-pits. Then the man who captured the girl approaches from the east, bearing a bow and arrow which belong to what is known as the Skull bundle; he shouts a war-cry and shoots the maiden in the heart. The chief priest opens the thoracic cavity of the maiden with the flint knife from the altar, and, thrusting his hand inside, besmears his face with blood. All the men, women, and children press forward now and aim each to shoot an arrow into the body.

There is always danger of mistaking analogy for genealogy. There is likewise danger of misconstruing the phenomena of parallelism and of convergence. The pathway of the prehistorian who would delve into the remote past is beset by difficulties far greater than those in the way of proving a kinship between the culture of the modern Plains Indians and the ancient culture of the Mississippi valley. His problem is bound up with the great, and as yet unsolved, problem of human origins. He must take into consideration not only relationships but also beginnings; and the beginnings of things human, so far as we have been able to trace them, have their fullest exemplification in prehistoric Europe. The cradle of the human race has not yet been definitely located. When it is found it will prove to be at least within easy reach of Europe, which structurally is the keystone of the Old World arch—still firmly planted against Asia and once in more intimate contact with Africa than at present.

The Old World then is the ample stage on which the human drama has been played. Here the cultural elements have had their exits and their entrances. The character of a culture at a given time and place should be viewed in the light not only of the elements that were present, but also those that were manifestly lacking. One can, for example, set about reconstructing the culture of *Homo heidelbergensis* or of Piltdown without danger of being misled by phenomena with which ethnologists have to reckon, namely, the disturbances resulting from a clash between cultures in almost totally different planes of development. In those days there was no danger of being discovered by a Columbus or conquered by a Cortés. Since the earliest times progress has been due in part to contact of one people with another and the resulting interchange of ideas. Infiltrations and invasions, peaceable or otherwise, have also brought changes. The evidence points to a diversity of human types as far back as the early Quaternary, but not to a corresponding cultural diversity.

Culture is a measure of man's power to control his environment. It depends largely on the inventive faculty and the facilities for transmitting racial experience. The dead level character of the so-called eolithic or pre-paleolithic industrial remains points to a long hand-to-mouth struggle for a racial bank account. Progress was slow even among the Chellean and Acheulian peoples. A rude Chellean industry was found associated with the Piltdown skull. Whether Mousterian culture was a direct outgrowth of the Chellean and Acheulian has not yet been determined. The human skeletal remains associated with Mousterian culture are of the Neanderthal type, representing a race of coarse mental and physical fiber, whose disappearance was coincident with the appearance of a new racial and cultural type. The ancestry of this new race, the Aurignacian, has not been definitely traced. The Aurignacians, represented by Cro-Magnon and Combe Capelle, were more nearly akin to the modern Europeans than to the archaic Mousterians. The cultural differences are at once so great as to make it difficult to conceive of the Aurignacian as having been an offshoot from the Mousterian age. The distribution of Aurignacian culture would in the opinion of Breuil seem to favor Africa rather than the east as a starting point.

The Aurignacians introduced the decorative as well as the fine arts: sculpture, bas relief, engraving, and painting. Through these we get a glimpse into their social and intellectual life. Some of their art works have been subjected to an interesting comparative study. For example, they left in a number of French and Spanish caves negative imprints of the human hand that manifestly point to phalangeal amputation, a practice that exists today among primitive peoples in widely separated parts of the earth. It was observed by Burchell among the Bushmen as early as 1812. It is also reported from Australia. According to Boas the Haida, Tlingit, and Tsimshian tribes of the Northwest Coast cut off a little finger on special occasions. Mindeleff reproduces a series of pictographs from the Cañon de Chelly, Arizona, in which representations of the human hand play an important rôle. He does not say however whether any of these show evidences of phalangeal amputation.

The Aurignacians likewise left us those perplexing female figures in the round from Brassempouy, Mentone, and Willendorf, as well as the bas reliefs from Laussel, all of which are reminiscent of the Bushman type of female beauty. The figures in question might however be explained on symbolic grounds rather than as realistic representations of a physical type.

If the Aurignacian culture came from the direction of the Mediterranean the same can hardly be said of the Solutrean which succeeded it and which seems to have come from the east. According to Breuil the early Solutrean is extensively developed in Hungary while the veritable Aurignacian is lacking there. It may be that the early Solutrean of the east is synchronous with advanced Aurignacian in France and that the Solutrean of the west was due to an invasion, which however did not remain long in the ascendancy; for out of the contact between these two civilizations there arose the Magdalenian culture, to whose further development the east and not the Mediterranean contributed.

One encounters difficulties in comparing paleolithic art with any art period that has followed. It differs not only from neolithic art but also from the art of modern primitive races. The art of the untutored child is more like that of neolithic or modern primitive art than it is like paleolithic art. The child does not copy the thing itself so much as his ideas about the thing. Paleolithic art evinces a remarkable familiarity with the object combined with a skilled hand. The artists' models were almost without exception from the animal world, chiefly game animals. Conditions favoring progress in art are normally just the reverse of those that would make a hunter's paradise. With the increase in density of population there would be a corresponding decrease of game. The animal figures were no doubt in large measure votive offerings for the multiplication of game and success in the chase. The more realistic the figure the more potent its effect would be as a charm. The mural works of art—figures of male and female, scenes representing animals hunted or wounded—are generally tucked away in some hidden recess, which of itself is witness to their magic uses.

Mythical representations, so common to modern primitive art and to post-paleolithic art in general, are wholly foreign to paleolithic art. There were no gods, unless the human figures served also as such; and no figures with mixed attributes, as is so well typified in the gold figurines of ancient Chiriquian art of the Isthmus, or in the Hindu and the Egyptian pantheon. The paleolithic artist left frescoes, engravings, bas reliefs, and figures in the round of the horse, but there is not a single figure of a centaur.

The cave man's love for the real, the natural, as opposed to the mythical, the artificial, is also seen in his representations of the human form. A child will draw the figure of a man or a woman as clothed, but with the legs for example showing through the dress. The same thing was done by the artists of ancient Egypt. Not so with the cave artist.

That paleolithic man of the art period made use of clothing the numerous bone needles afford abundant testimony; but with a single possible exception (Cogul in southeastern Spain), and that, if an exception, dates from the very close of the paleolithic period, the human form was represented in the nude; some of the figures however suggest a more pronounced growth of hair over the body than would be common at the present time.

There is very little evidence that masks were used either ceremonially or for stalking purposes. An engraving of a male figure wearing a mask representing a horse's head has been noted from the Magdalenian deposits of the cave of Espelugues at Lourdes. Three engraved figures on a bâton de commandement from the rock shelter of Mège at Teyjat (Dordogne) have been reproduced by Breuil. A third example was found at Mas d'Azil—a man wearing a bear's head mask.

Art objects dating from the paleolithic period have every appearance of being originals and not copies. Earmarks of the copyist are singularly lacking. The work was done either in the presence of the model or with the image of the latter fresh in the memory.

Ethnology has done much toward illuminating some of the dark pages of European prehistory. But European ethnology is too far removed from paleolithic and pre-paleolithic Europe to be as good a guide there as the ethnology of the Indian is to prehistoric America. There are those who are inclined to criticize the temple of classification reared by the European prehistoric systematists. They call it too simple, too perfect, too academic—a system based on answers to the easy questions with all the puzzling problems left out of account, and therefore admirably calculated to attract the amateur. The critics however usually have very little first-hand knowledge of the European field. On the other hand those who have done most to develop the systematic side are the first to acknowledge not only the weaknesses of the classification, but also the complexity of the problems still confronting the prehistorian. No one who can speak with authority claims that the system can at present be applied anywhere except to central, southern, and western Europe. A certain definite succession of cultures already holds good over a large area. The horizon we call Solutrean, for example, need not however be synchronous in Hungary and southwestern France. When Asia and Africa shall have been studied with equal thoroughness there will be much to add and no doubt some to subtract. There can be a system of classification and still allow for all sorts of local rises and falls of the culture barometer as well as movements of peoples over large areas. All

the people did not follow a retreating glacier to the north. But all who did follow were driven slowly back with the succeeding advance of the great continental ice sheet. And it is not likely that they recognized those whose ancestors had been left behind so many thousands of years before. Lapse of time and differences in the environment must have left their impress on both classes of culture, the contact between which would eventually result in a new phase of culture. The wonder is that any system could be discovered, and I say discovered rather than devised advisedly, which could long withstand so complex and heavy a strain. The system in its elemental outlines still survives; and where there is life there is hope, and the possibility of future growth.

REMARKS BY BERTHOLD LAUFER

THE value of a scientific method, in my estimation, cannot be determined by theoretical discussion. The academic exposition of a method may strike ear and mind favorably, and yet it may be unworkable if the practical issues of a science are at stake in broad daylight. The quality of a method is discernible only from the fruits which it yields. It remains a brutal fact that the worth of a man is estimated by the world at large from his outward success in life; in similar manner the merit and utility of a method are judged according to the degree of its success. It is sheer brutality and cold-hearted calculation if we are tempted to adopt the most successful method in the pursuit of our work. In matters of archeology it has always seemed to me that classical archeology, the oldest of the archeological sciences, has hitherto made the most successful advance; and for this reason it is deemed advisable to extend its methods, as far as feasible, to other fields of antiquarian exploration. But if a more effectual method should ever be contrived, I believe I should be inclined to abandon my own boat and embark on the new.

Archeology is largely a matter of practical experience; and, wide and unlimited as the range of experience is, the variability of methods applicable to specific cases is almost endless, and we may well say that each case must be judged by its own particular merits. Archeological problems may be likened to algebraic equations with one, two, or several unknowns: by starting from a given fact, we endeavor to unravel by it the one or more unknowns. If archeology is more than a mere description and classification of ancient remains left by past ages (and this could assuredly be only its technical foundation, which may be described under the term "museology"), but if it is the science of the ancient culture-phases of mankind illustrated by all accessible human monuments, it is needless

to insist that archeological study cannot be separated from philology and ethnology. It is a branch of historical research, a part of the history of human thought and culture; and as far as Asia, Africa, and Europe are concerned, it is obvious, without the shadow of a doubt, that only a combined knowledge of language, paleography, history, and culture will lead us to any positive and enduring result in archeological questions. Take, for example, the case of Egyptology. The very word indicates the specific character of the science. We do not speak of such divisions as Egyptian history, archeology, philology, and ethnology, but of *Egyptology* only, because a scholar desirous of promoting this research must be firm in every saddle. The great architectural monuments of Egypt are covered with contemporaneous inscriptions revealing their significance; and well-trained familiarity with the script and language, with chronology and events, with religious and other ideas, becomes the indispensable equipment for any one serving the cause of the archeology of Egypt. When we come to India, the situation is widely different. India has no historical records, and lacks any sound chronology. The accounts of the Greek, Chinese, and Arabic authors must partially supplement this deplorable gap. Monuments are comparatively plentiful, some are also augmented by coeval inscriptions, but, on the whole, they are cut off from contemporaneous tradition. The spirit of India is highly imaginative—essentially occupied with religious, mythological, and philosophical speculations, supported by an inexhaustible fund of good stories and legends. The skilful interpreter of the monuments of Indian art must naturally have these at his fingers' ends, and, to make good for the lack of historical data, ought to have recourse also to the application of psychological methods.

In China we are confronted with a peculiar situation unparalleled in classical antiquity and elsewhere. Here we face the unique fact that the Chinese themselves have created and highly developed a science of archeology beginning at a time when Europe still slumbered in the night of the middle ages. The Chinese, indeed, were the first archeologists in the world: the first to explore the soil; the first to do field-work; the first to collect, arrange, catalogue, and illustrate antiquities; the first to study and describe their monuments—with most notable results. This feature naturally offers to us many vantage points; and the study of Chinese archeology, accordingly, must begin with a study of the archeology of the Chinese. The foreign student intent on the solution of a special problem will in this manner easily see a point of attack, and will find his path through the jungle cleared to some extent by the contri-

butions offered by Chinese scholars. This state of affairs, however, has also grave drawbacks which must not be overlooked; and among these, two are important. The circumstantial evidence of Chinese antiquities, in general, is weak; the localities where they have been found are sometimes but vaguely known; the circumstances of the finds are seldom, and then but imperfectly, described to us. Again, the Chinese have their own peculiar theories, their point of view in looking at things, their peculiar logic and mode of argumentation, and have accumulated on top of their antiquities, and on the whole of their culture, huge strata of speculations and reflections which in most cases cannot withstand our sober criticism. It was a development easy enough to understand that until very recently our scholars meant to make Chinese archeology by merely reproducing the opinions of Chinese archeologists. This necessarily resulted in numerous errors, misconceptions, and wrong judgments, the effects of which are not yet overcome. These strictures being made, the outlook in this field is altogether hopeful. We have remains and antiquities in great plenty, and an overwhelming abundance of information accompanying them—often more, I should add, than we are able to digest. Above all, our conclusions can be built upon the firm basis of a secure and reliable chronology, and in the majority of cases we might say it is out of the question that a Chinese monument or object should not be datable within a certain period. The aim of Chinese archeology, as I understand it, should be the reconstruction of the origin and inward development of Chinese culture in its total range, as well as in its relation to other cultural provinces. A proper knowledge of China is bound up in this definition. We cannot comprehend any idea of modern China, or adequately treat any Chinese problem, without falling back on the past. The distinction between archeology and ethnology, consonant with the actual conditions in America, seems, at least to me, to be somewhat out of place in such fields as China, central Asia, and Siberia. The modern ethnographical conditions in these regions mean so little that they amount to almost nothing, being merely the result of events of the last two centuries or so. My conviction that there is in principle no essential difference between archeological and ethnological methods could not be better illustrated than by the fact that the method of Chinese archeology—at least, as I am inclined to look upon it—is in perfect harmony with the method of ethnology as conceived and established by Dr Boas. It is among the Chinese, even to a much higher degree than among primitive tribes, that we constantly have to reckon with such potent factors of mental development as recasting of old ideas

into new forms; reinterpretation of ancient thoughts under the influence of new currents, theories, or dogmas; new associations, adaptations, combinations, amalgamations, and adjustments. The ideas expounded by Chinese scholars of the middle ages with reference to their classical antiquity one or two thousand years back are, in fact, nothing but subjective reconstructions of the past based largely on deficient associations of ideas. This feature is most striking, for instance, in decorative art. The Sung artists of the middle ages attempted to reconstruct all the primitive patterns on the ritual objects of the archaic period on the basis of the names of these patterns as handed down in the texts of the ancient rituals. All these names were derived from natural objects, but referred to geometrical designs. A combination of hexagons, for example, was styled a "rush" pattern, because it was suggestive of a mat plaited from rushes, and may indeed have been developed from a mat impression. In the Sung period, art was naturalistic, and these artists reconstructed the ancient geometric rush pattern in the new form of realistic rushes. In this manner a new grammar of ornaments was developed, purported to represent the real ornaments of the classical period, which, however, had never existed at that time. Cases like this may have happened a hundred or a thousand times among primitive tribes, not only in art, but in social and religious development as well.

The further advantage of this critical and reconstructive method is that it finally leads us to psychology, and allows us to recognize the laws working in the Chinese mind. And this, after all, must be the ultimate aim of all our research—the tracing and establishing of the mental development of a nation, the grasp of the national soul, the determination of its qualities, aspirations, and achievements. From this point of view, we may say paradoxically, and yet correctly, that all archeology should become ethnology, and all ethnology turn into archeology. The two, in fact, are inseparably one and the same—emanations of the same spirit, pursuing, as they do, the same ideal, and working to the same end.

Finally I may perhaps be allowed a word concerning the relation of American archeology to ethnology, although I must first apologize for talking of something about which I do not properly know. It is difficult for the present to bridge American archeology and ethnology; but it seems to me that this entire question has no concern whatever with methods, or that no alleged or real deficiency of methods could be made responsible for any disappointments in certain results that may have been expected. The drawback lies solely in the material conditions of the field, and prominent among these is the lack of a substantial chro-

nology. Chronology is at the root of the matter, being the nerve electrifying the dead body of history. It should be incumbent upon the American archeologist to establish a chronological basis of the precolumbian cultures, and the American ethnologist should make it a point to bring chronology into the life and history of the postcolumbian Indians. This point of view, it seems to me, has been almost wholly neglected by American philologists and ethnologists, and hardly any attempt seems ever to have been made to fix accurately the time of traditions, mythologies, rituals, migrations, and other great culture movements. This, however, must be accomplished, and I am hopeful enough to cherish the belief that it *will* be accomplished. When archeology and ethnology have drawn up each its own chronology, then the two systems may be pieced together and collated, and the result cannot fail to appear. Whether we who are here assembled shall ever live up to that happy day, is another question. Meanwhile we ought not to be too pessimistic about the outcome, or to worry too absorbingly about the issue of methods. We should all be more enthusiastic about new facts than about methods; for the constant brooding over the applicability of methods and the questioning of their correctness may lead one to a Hamletic state of mind not wholesome in pushing on active research work. In this sense allow me to conclude with the words of Carlyle: "Produce! Produce! Were it but the pitifullest infinitesimal fraction of a product, produce it in God's name! 'Tis the utmost thou hast in thee: out with it, then!"